Sarvajanik University

Sarvajanik College of Engineering & Technology, Surat

Bachelor of Technology (B.Tech.)

Instrumentation & Control Engineering

SARVAJANIK UNIVERSITY

INCLUSIVE | INTEGRATED | INNOVATIVE

B.Tech. II Semester – III (working Professional)

Subject Name: Applied Instrumentation **Subject Code: BTIC15381**

Type of course: Open Elective Course

Prerequisite (if any): Engineering physics, Basic electronics

List of Courses where this course will be prerequisite: Not Applicable

Rationale:

Any engineer, with irrespective of his/ her engineering background, working in manufacturing/ process industries have to deal with various types of instruments and instrument systems. This course describes the basic principles and operation of various instruments primarily used to measure important parameters/ variables in industries.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
3	0	0	3	60	25	15	--	--	100

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests CA2: Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

S. N.	Content	Total Hrs	Module Weightage
1	**Basic of Control loop** Open loop/ Close loop, Loop instruments and their function Pneumatic instruments - flapper nozzle system Electronic instruments- basic block Instrumentation symbols.	3	7 %
2	**Temperature Measurement** Temperature scale, change in dimensions, Change in electrical properties, Thermo- electricity, Fibre-optic sensors, Quartz thermometer, Radiation pyrometers.	5	11 %
3	**Pressure Measurement** Pressure units and conversion, comparison with known dead-weights, force-summing devices, Secondary transducers, Vacuum measurement.	5	11 %
4	**Level Measurement** Mechanical level indicators, Optical level indicators, electrical level indicators, Radioactive methods, Magnetic switches.	5	11 %

5	**Flow Measurement** Reynolds numbers and flow patterns. Mechanical flow meters. Electronic flow meters.	5	11 %
6	**Strain Measurement** Stress-strain relations, Resistance strain gauges, Fiber-optic strain gauges.	4	9 %
7	**Miscellaneous Measurements** Humidity and moisture, pH, Turbidity, Basic of chromatography.	5	11 %
8	**Control Room** Control room layouts, Control panel Types, Flat face panels, Breakfront panels, Consoles, Comparison of panel types, Panel layout, Face layout. Rear Layout, power requirements.	4	9%
9	**Control Valve** Valve Terminology, Valve Capacity, Valve range ability, - Valve type based on body design, Flow Characteristic, Actuators, Positioners, Control Valve Accessories.	5	11%
10	**Transmitter, Indicator, Recorder and Alarm annunciator.**	4	9%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20 %	**30 %**	**20 %**	**10 %**	**10 %**	**10 %**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Introduction to Measurements and Instrumentation	A. K. Ghosh	PHI publications ISBN: 9788120346253	2013	4th
2	Instrument Engineers' Handbook - Process Measurement and Analysis	B. G Liptak	Butterworth-Heinemann Ltd ISBN: 9780750622547	1995	3rd
3	Encyclopedia of Instrumentation and Control	D.M.Considine,	McGraw-Hill Inc.,US ISBN: 9780070124240	1971	1st
4	Industrial Instrumentation	K Krishnaswamy, S. Vijyachitra	New Age International ISBN: 9788122427509	2020	2nd
5	Transducers and Instrumentation	DVS Murthy	ISBN-978-81-203-3569-1	2012	2nd

Course Outcomes: After learning this course, students will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	interpret various performance criteria of instruments.	20
CO-2	discuss the principle of operation and working of various measuring instruments.	20
CO-3	evaluate the performance of various measurement methods according to the different applications	20
CO-4	analyze measurement constraint of various measurement techniques.	20
CO-5	do testing and calibration of measuring instruments	20

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	2	2	1	1	1					1	1		1	1	1
CO-2	3	2	2	2	2	1	1			1	1	1	3	1	1
CO-3	2	2	2	2	1	1	2	1		1	1	1	3	1	1
CO-4	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1
CO-5	2	2	1	1	1	3	2	1	1	1	1	1	3	1	1

Rationale* : This subject will develop skill like analyze, evaluation, testing and other among the students. The CO-PO-PSO mapping is reflecting it.

List of Open learning website:

1. http://nptel.ac.in/video.php?subjectId=108105064
2. http://www.onlinevideolecture.com/electrical-engineering/nptel-iit-kharagpur/industrialinstrumentation/?course_id=514
3. https://www.isa.org
4. https://instrumentationtools.com/instrument-calibration-lab-exercise/
5. http://www.iceweb.com.au/Test&Calibration/Test%20and%20Calibration.htm